Aug. 21, 1928. 1,681,322

H. CAVE

WASHING MACHINE

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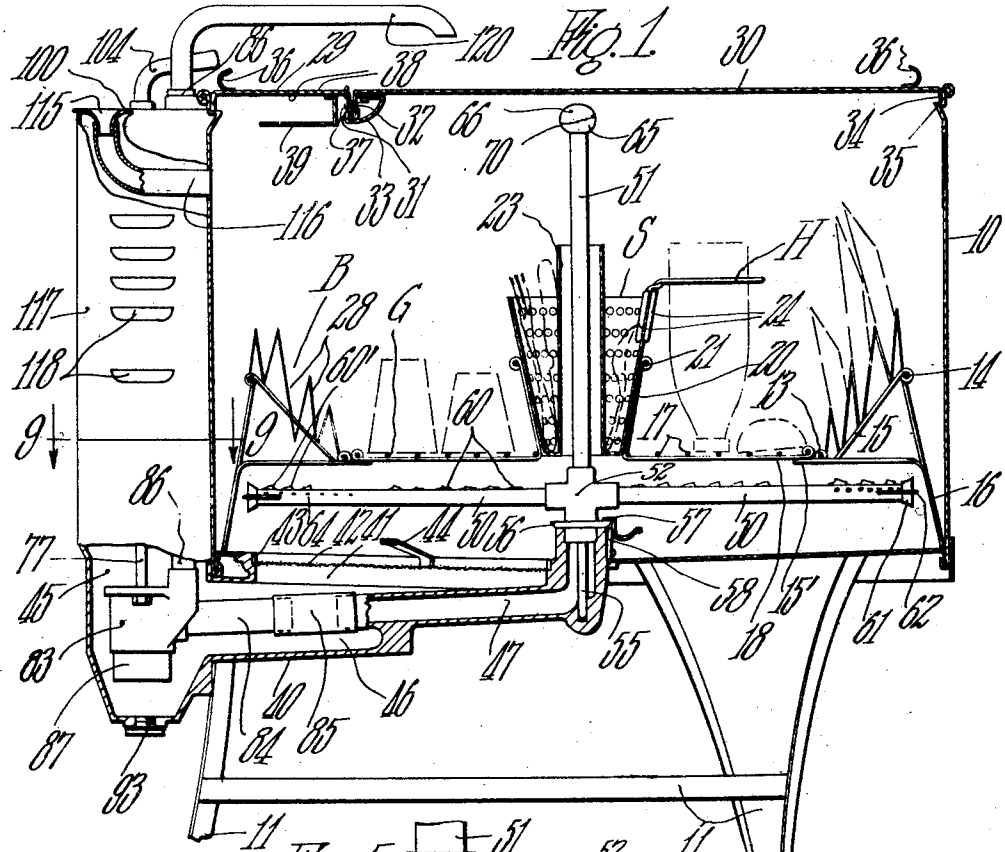


Fig. 1.

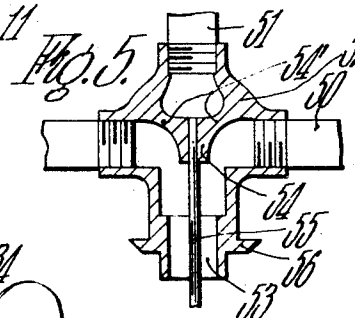


Fig. 5.

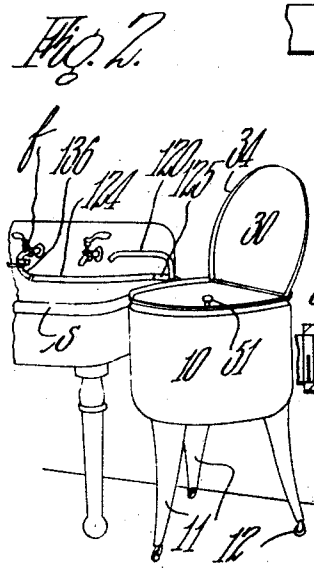


Fig. 7.

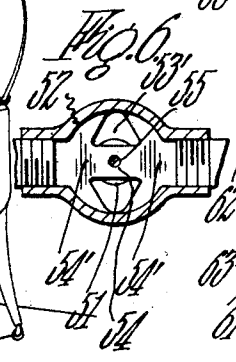


Fig. 6.

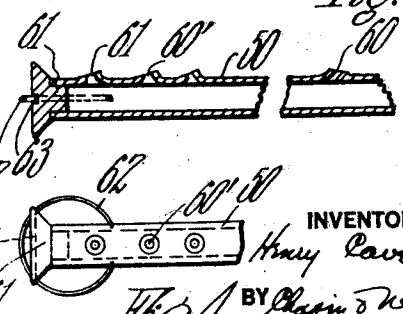


Fig. 3.

Fig. 4.

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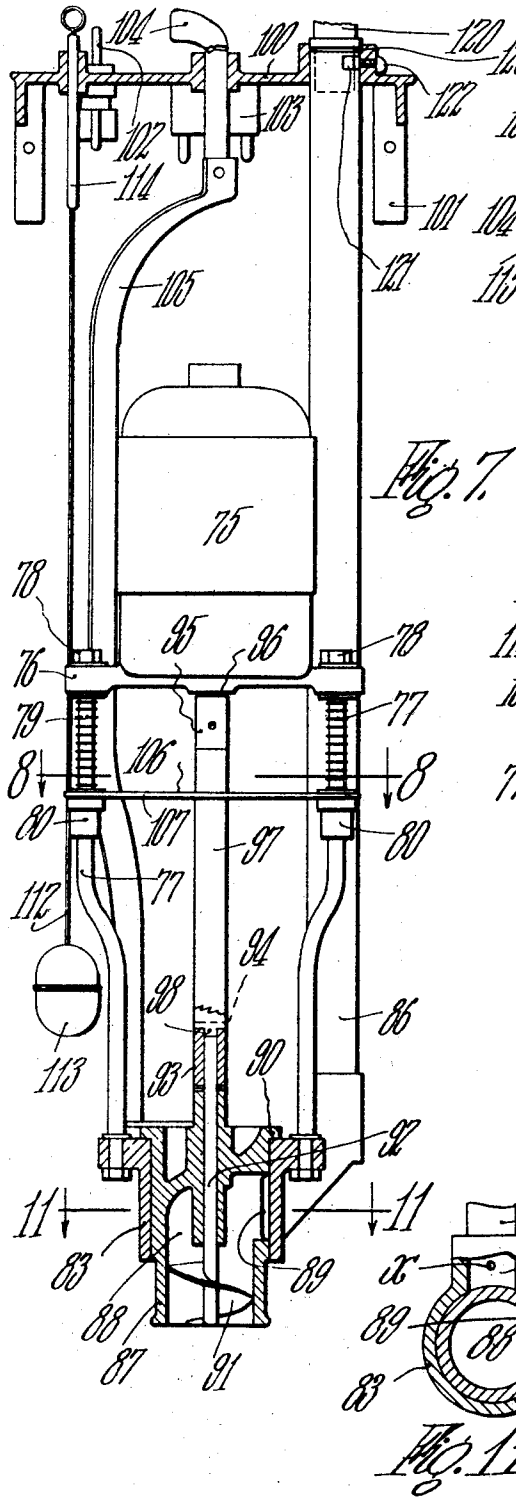


Fig. 7.

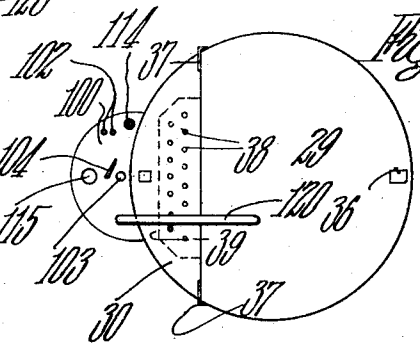


Fig. 10.

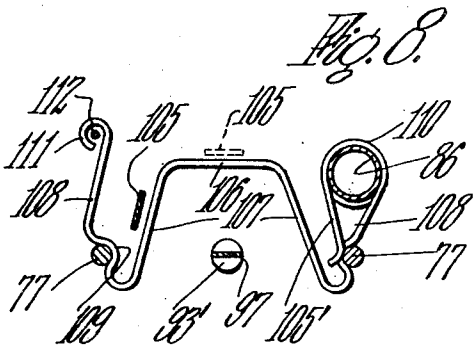


Fig. 8.

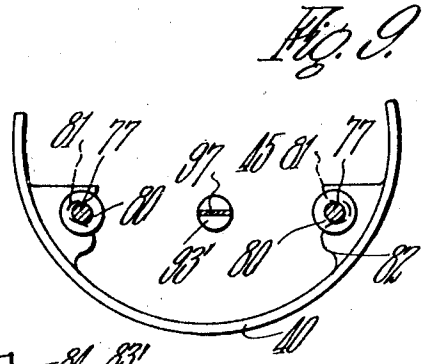


Fig. 9.

Fig. 11.

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Fig. 12.

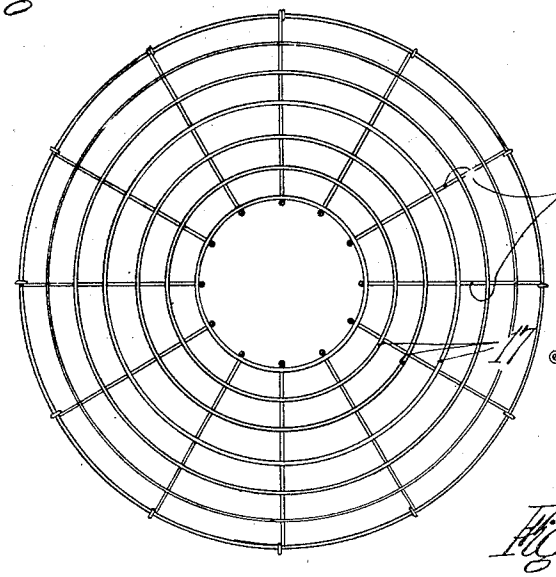


Fig. 13.

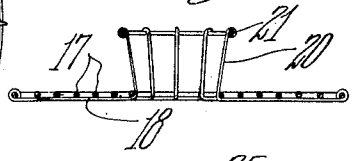


Fig. 16.

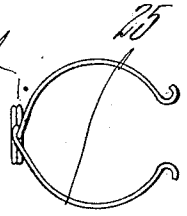


Fig. 14.

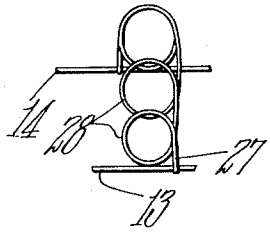
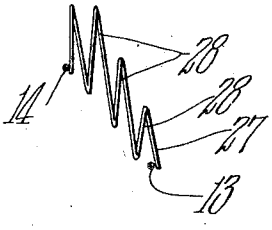


Fig. 15.



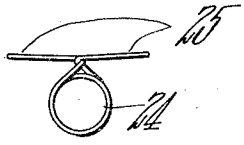


Fig. 17.

Fig. 18.

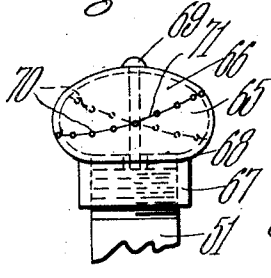


Fig. 19.

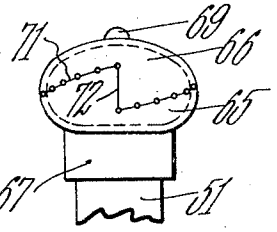
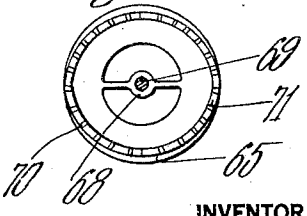


Fig. 20.



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Fig. 11.

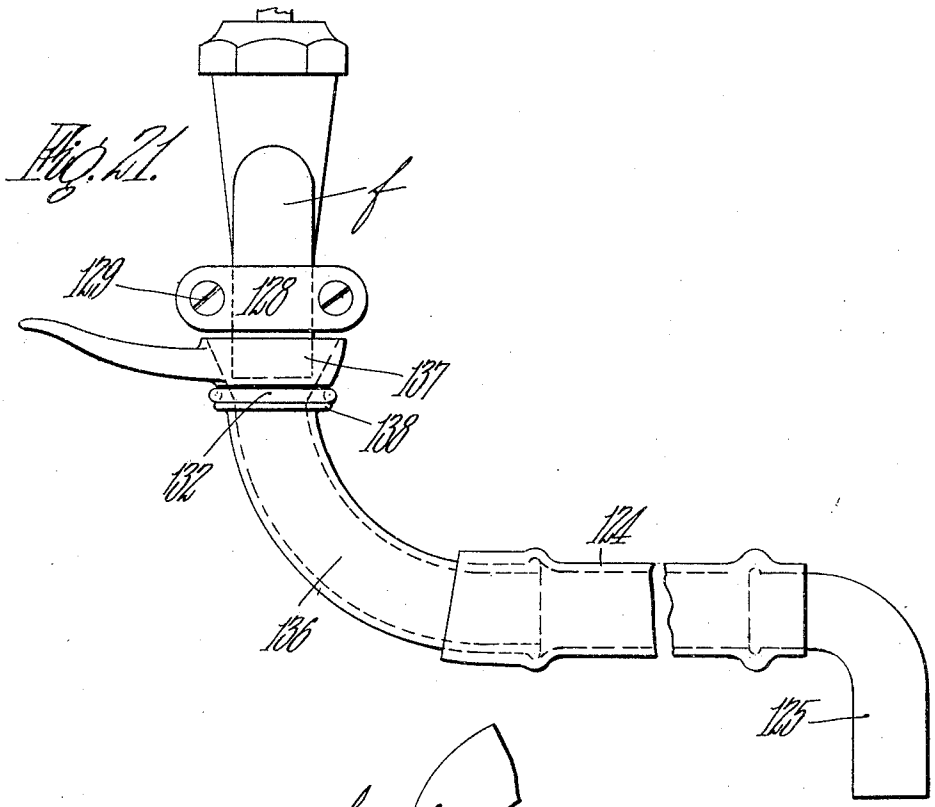
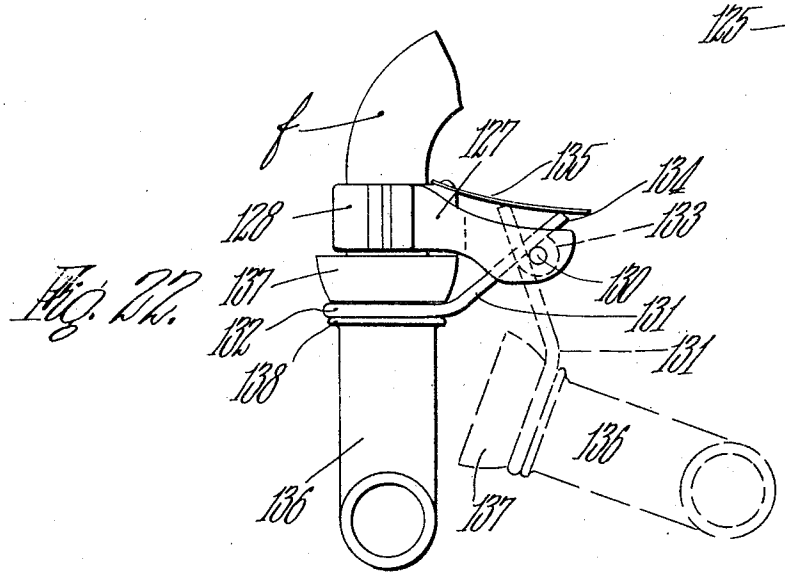


Fig. 12.



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Fig. 23.

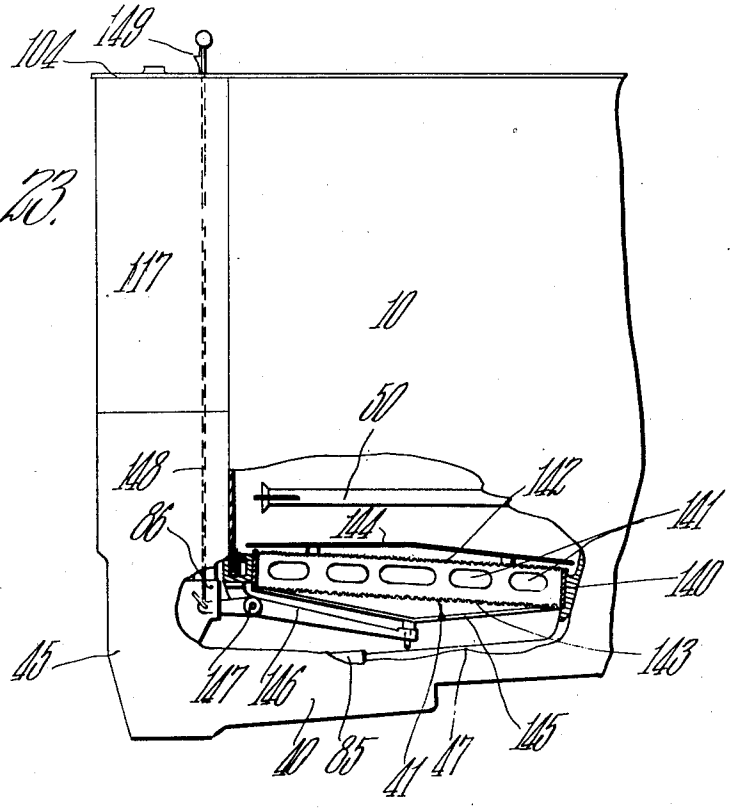
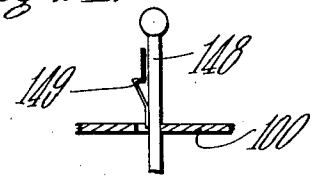


Fig. 24.



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Patented Aug. 21, 1928. 1,681,322

UNITED STATES PATENT OFFICE.

HENRY CAVE, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO THE FULLER BRUSH COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF CONNECTICUT.

WASHING MACHINE.

Application filed May 17, 1922. Serial No. 561,686.

This invention relates to washing machines and, more particularly, to machines which are adapted for washing dishes and the like.

The general objects of the invention are to provide a machine which is particularly suitable for household use, portable in order that it may be utilized in conveying the dishes to and from the table, efficient in the washing operation, quiet in operation, and economical in power consumption.

Other objects of the invention relate to the distribution of water in the washing tank in a scientific and effective manner, and to the supporting of the dishes in the washing tank in such a manner that all portions thereof may be effectively washed.

Other objects relate to specifically improved mechanical structure as will appear in the following description and in the illustrative embodiment of the invention in the accompanying drawings, in which,—

Fig. 1 is a sectional elevational view of a washing machine embodying the invention;

Fig. 2 is a perspective view thereof illustrating a preferred manner of supplying water to, and removing it from, the machine;

Fig. 3 is a fragmentary sectional elevation of one of the tubes of the spray rotor;

Fig. 4 is a fragmentary plan view of the latter;

Figs. 5 and 6 are fragmentary sectional elevation and sectional plan views, respectively, of the spray rotor, showing the central portion thereof and the manner in which the water is distributed to the spray tubes;

Fig. 7 is an elevational view of the unit power-pumping apparatus employed with the machine, showing the spring suspension means and showing also certain associated parts relating to the control of the operation of the machine;

Fig. 8 is a sectional plan view taken on the line 8—8 of Fig. 7;

Fig. 9 is a sectional plan view taken on the line 9—9 of Fig. 1;

Fig. 10 is a plan view of the machine;

Fig. 11 is a sectional plan view taken on the line 11—11 of Fig. 7;

Figs. 12 and 13 are plan and sectional elevational views respectively, of the grid member of the dish holding basket;

Figs. 14 and 15 are fragmentary front and elevational and cross-sectional views respectively of the side wall of the basket;

Figs. 16 and 17 are plan and end elevational views respectively of a holder for milk bottles and the like, employed in conjunction with the basket;

Figs. 18 and 19 are elevational views taken at right angles and showing the spray ball portion of the spray rotor;

Fig. 20 is a plan view of the lower section of the spray ball;

Figs. 21 and 22 are elevational views, taken at right angles and showing an attachment for use in supplying water to the machine;

Fig. 23 is a fragmentary elevational view, partly in section, showing a modification; and

Fig. 24 is an enlarged view of a detail shown in Fig. 23.

Referring to these drawings, the machine includes a cylindrical or drum-like tank 10 (Fig. 1), the interior of which constitutes the washing chamber. Tank 10 is preferably portable in order that it may be moved to and from the dining room for convenience in loading and unloading it, and to this end the tank is shown as supported by a suitable framework 11 which is mounted in turn on casters 12. The framework 11 preferably consists of three uprights arranged in triangular arrangement (Fig. 2).

Within the washing chamber, there is a suitable support, or container, for the dishes to be washed, which preferably takes the form of an open mesh basket, represented generally by reference letter B in Fig. 1. The main frame of this basket consists of two circular rings 13 and 14, which may advantageously be formed of heavy wire. The rings 13 and 14 are of different diameter,—the larger ring 14 being disposed above the smaller ring 13 in concentrical relation therewith and in a plane parallel to that in which ring 13 is located. The rings 13 and 14 are held in this relation and are supported from the base of the tank 10 by a series of members (three as shown) which are disposed in angularly spaced rela-

tion about the rings. Each of such members consists of a wire 15 looped, or otherwise joined at one end, to ring 14 and extending to ring 13, to which it is joined, as by looping the wire therearound or otherwise. The wire 15 then extends a short distance inwardly from ring 13 to form a ledge 15′ and then outwardly therefrom. This outwardly extending portion is bent downwardly and then back upon itself in substantially U-shape form to form a supporting leg 16, the free end of the wire 15 being finally looped around, or otherwise joined to, the ring 14.

The base of basket B preferably takes the form of a removable grid G, upon which hollow ware, such as cups, glasses, bowls and so forth, may be supported in inverted relation as indicated in Fig. 1. Grid G, as best shown in Fig. 12 includes a series of rings 17, preferably of wire, and all of different diameter, which are located in substantially concentrical relation and disposed in a common plane. Below these rings is a series of cross wires 18, which are disposed radially of the rings and are suitably joined thereto as by brazing, soldering, welding or the like. The outer portion of the grid rests upon ledges 15′ whereby the grid is supported, and the marginal portion of the grid is presented against, or limited in lateral displacement by engagement with ring 13. The inner ends of wires 18 are bent upwardly, as best shown at 20 in Fig. 13, and are suitably joined to a ring 21. The portions 20 form an upwardly flaring socket for the reception of a frusto-conical holder S (Fig. 1) herein shown as fashioned from foraminous metal and having a central tubular portion 23 extending upwardly from its base. The portion 23 is provided to receive a rotatable spray pipe and prevent the articles in holder S from engaging such pipe. The holder S is obviously removable from the grid, when desired, and is adapted to receive silver ware and the like. For supporting a milk bottle or the like, so that it will drain, the mouth of the bottle is rested on grid G and a holder H, removably secured to the holder S, is provided to prevent it from tipping. This holder H may advantageously be formed from wire bent up in the manner shown in Figs. 16 and 17 to provide two coils 24 and two curved spring arms 25 which extend outwardly approximately at right angles thereto and are curved to encompass the bottle. The coils 24 form a spring clip for attachment to holder S in an obvious manner.

Plates, platters, saucers and other dishes of a substantially flat nature are stacked on edge around the periphery of grid G in suitable holders. Preferably, each of these holders is formed of a wire 27 bent to form a series of open coils 28 Figs. 1, 14 and 15. Each holder extends from wire 13 diagonally upwardly to the wire 14 and the ends of wire 27 are suitably attached, as by looping them around, the wires 13 and 14. A large number of these holders are provided at closely spaced intervals about the periphery of the basket and they form the side walls for the latter. The dishes are inserted between the coils 28, as shown in Fig. 1, and these holders permit a large number of dishes to be stacked on edge about the outer portion of the basket, preferably in several closely adjacent circular series, as shown.

The tank 10 is closed at its upper end by a cover which preferably comprises two unequal sections 29 and 30 suitably hinged together (Fig. 1). As shown, this hinge connection consists of interengaging flanges 31 and 32 turned inwardly from the sections 29 and 30, respectively,—one of these flanges, as 31, having a portion 33 curved with member 32 as a radius to permit relative swinging movement between the cover sections. These interengaging flanges also insure against leakage of water through the hinge connection of the cover sections during the washing operation. The outer marginal portions of the cover sections are turned downwardly, forming flanges 34 which rest upon a bead 35 formed in tank 10. This engagement of flanges 34 with bead 35 is such as to insure against the escape of water from the washing chamber during the operation of the machine. The larger cover section 30 is ordinarily used to gain access to the washing chamber and basket B for the purpose of loading and unloading the latter. However, when the machine is not in use, the smaller cover 29 may be raised for the purpose of permitting a circulation of air within the washing chamber. When the machine is not in use, the section 30 may be used as a table and the section 29, being raised as just described, serves as a back for the table thus afforded. The cover, as a whole, may be turned relatively to the tank and also readily removed as an entirety therefrom. Suitable handles, such as 36, may be provided on the cover sections 29 and 30 to facilitate the lifting of them. Two hooks 37 (Figs. 1 and 10) are provided on the smaller section 29, one on each side thereof and near the hinge connection. These hooks extend downwardly from the cover and exteriorly of the tank, being disposed closely adjacent the peripheral wall thereof in order to prevent by their engagement with such wall any substantial longitudinal movement of the section 29, when section 30 is in open position, which might otherwise occur.

When hot water is discharged into tank 10 with the covers in closed position, there results an expansion of the air in the tank and such expansion tends to and frequently does lift one of the cover sections, allowing water

to be thrown out of the machine. To prevent this undesired result, I provide a plurality of perforations 38 in the cover, as for example in section 29 (Fig. 10), through which air may freely pass. Beneath the perforations, and spaced therefrom is a shield 39 suitably fastened to the cover at one end by an angular extending portion which closes such end against ingress of water. The other end is left open for the passage of air to or from the perforations. As a matter of practice no water enters this end because all streams striking the cover section 29, between such end and the adjacent wall of tank 10, do so in substantially vertical directions.

Fixed to the base of tank 10 is a casting 40, which communicates with the washing chamber through an opening 41 (Fig. 1). This opening is provided with a screen 42 carried by a ring frame 43, which fits in a socket formed in casting 40 and is removable therefrom by means of a handle 44, spanning ring 43 diametrically and secured at its ends thereto. Access to the screen 42 is had by removing the grid G. The casting 40 extends beyond the outer periphery of tank 10 and extends upwardly in closely adjacent relation with tank 10 for a short distance to provide a reservoir 45 and the opening 41 is in constant communication with reservoir 45 by means of a passage 46 which slopes toward, and drains into, the reservoir. Also formed in casting 40 is an inlet pipe 47, one end of which projects into the passage 46 for connection to the discharge pipe of the pump, to be later described, and the other end of which opens into the base of the washing chamber,—such end being turned vertically upward for this purpose.

Water is distributed in the washing chamber for washing and rinsing purposes by means of a spray rotor, which comprises two diametrically opposed horizontal tubes 50 and a central vertically extending tube 51. The former underlie the basket B and the latter passes upwardly through and above the described tube 23. These tubes 50 and 51 are suitably fixed, as by soldering, in a hollow, cross-like fitting 52 and in three of the four openings thereof. Within the fitting 52 is hub 54 (Figs. 5 and 6) to which is fixed a rod 55 which extends downwardly through and beyond the other opening 53 of the fitting. The hub 54 is connected to the walls of fitting 52 by webs 54′ which function as curved baffle plates to deflect part of the water into one tube 50 and another part into the other tube 50. These webs, however, do not entirely close off the upper interior portion of fitting 52 and openings 53′, on opposite sides of hub 54, are left to permit water to pass to tube 51. The hub 54 and its webs 54′ are utilized to distribute the stream, which passes upwardly in openings 53, and divide and apportion it properly. As shown, substantially one quarter of the stream is deflected into each tube 50 and one-half into tube 51.

The lower end of fitting 52 is rotatably mounted in the vertically disposed open upper end of inlet pipe 47 (Fig. 1) and rod 55 extends into such end of the inlet pipe and is received in a suitable bearing formed in the lower portion of the wall thereof. Fitting 52 carries a flange 56 which rides upon the upper end face of inlet pipe 47 and overlying this flange is a latch 57 carried on one end of a spring 58 which is fixed at its other end to the hub of inlet pipe 47. The latch 57 prevents the spray rotor from being displaced upwardly by the pressure of the water while the machine is in operation. This construction also permits the spray rotor to be conveniently removed as an entirety for cleaning and inspection, when desired.

The tubes 50 of the spray tube are alike in construction. Each has a plurality of outlets to direct water in a general upward direction and these outlets are preferably something more than mere holes drilled through the wall of the tube. Rather they are scientifically formed nozzles to direct the water in a definitely planned way. The tubes for the sake of lightness have thin walls, and to permit proper nozzles to be formed in such walls, the tubes are made up from flat sheet metal.—the nozzles being first formed and then the sheet being rolled up into cylindrical form and the longitudinal seam welded or soldered. Typical nozzles are shown in full detail in Fig. 3 at 60 and 60′. They are formed by punching the metal outwardly, and in this manner walls of substantial length are provided for the nozzles, whereby to effectively direct the streams issuing therefrom. Preferably, as shown in Fig. 3, the nozzles 60 are given a slight slant, backwardly from the direction in which the water passes through the tube, to counteract the tendency of the jets, issuing from the nozzles, to deflect in the opposite direction. By slanting the nozzles, as described, the jets issue therefrom in vertical directions. The nozzles 60′, however, are slanted in a reverse direction because it is desired to have the streams emitted in a slanting direction to strike the walls of tank 10.

The tubes 50, being formed from sheet metal, as described, have open ends and the outer open end of each is closed by a plug 61. A spring loop 62, having the ends thereof seated in oppositely disposed small recesses in the wall of tube 50, engages the outer face of plug 61 and holds it in place against the pressure of the water in the tube. The central portion of loop 62, preferably seats in a slot 63 in plug 61. To re-

move the plug the side portions of loop 62 are squeezed together which frees the central portion from slot 63, whereupon the loop may be swung downwardly out of the way to permit the plug to be pulled out.

The nozzles are preferably arranged in three series,—of which two, comprising nozzles 60 and 60′, are arranged on the top portion of the tube. The inner series, comprising the nozzles 60, from which sprays issue vertically upwards, serves to direct water into the interior of the hollow ware supported on grid G. The outer series, comprising the nozzles 60′, from which sprays issue in outwardly slanting directions, directs water against the wall of tank 10 and such water travels upwardly along the wall until it strikes the cover, where it is deflected downwardly striking against the backs of the dishes in the spring coil holders 28. Some of the water from the last named series of nozzles probably strikes the side wall of tank 10 and is deflected laterally against the backs of the dishes. The third series of nozzles are shown at 64 and are so located that the reaction from the jets rotates the spray rotor. The last named nozzles throw long curving streams, some of which strike upwardly against the faces of the dishes in the spring holders 28, and others of which strike the wall of tank 10, travel upwardly along such wall to the cover and are then deflected downwardly upon the backs of the dishes in holders 28.

The downward distribution of water upon the articles to be washed is effected by nozzles in a spray ball fixed to the upper end of tube 51. This spray ball, as shown in Figs. 18 and 19 is made in two sections 65 and 66,—the former having a hub 67 for attachment to tube 51, in any suitable way, and a spider 68 in the interior of the hub, and the latter having a central opening to receive a screw 69 which threads into the spider 68 and clamps the two sections together. The spray ball has in its peripheral wall two like series of nozzles 70. Each series extends half way around the circumference of the spray ball and the nozzles in each series are laid out in a curve, such as a portion of a helix. Each nozzle of a series is therefore located in a different plane. In addition, each nozzle 70 of each series is directed at a different angle to the vertical axis of the ball. Starting with the highest nozzle of a series, the jet therefrom issues substantially horizontally, or at right angles to the axes of the ball. Such jet will strike the side wall of tank 10 and be deflected back against the articles in the basket and a portion of this jet may even strike the undersides of the cover sections 29 and 30 and be deflected downwardly. The next nozzle 70 of a series may direct its jet at a slight angle to the horizontal, the next at a greater angle and so on until the last nozzle of the series is reached which directs its jet into the silver holder S. By means of the spray ball, water is directed from almost every conceivable angle against the dishes,— mostly downwardly although, as set forth above, some of the jets strike the side wall of the tank and are deflected in various ways, some striking more nearly horizontally against the articles and causing the backs of the dishes in the spring holders 28 to be washed from above. The spray ball directs water over the faces of the dishes in these holders, over the exterior surfaces of the hollow ware and into the silver holder S.

Due to the varied angularity of the nozzles in the spray ball, it is an exceedingly difficult part to manufacture by ordinary methods. That is, if the nozzles were drilled, each would have to be drilled separately. It is difficult to devise jigs or forms to facilitate the work and the latter would have to be performed largely by hand. The accuracy of the directions of the nozzles and uniformity of the work would be seriously impaired. To avoid all this and reduce the cost of manufacture of this part to a minimum, I have found that I can construct the device in the two sections described, each of which can be die cast. The spray ball is split along two curved lines 71, the ends of which are joined by vertical lines 72. The lines 71 are those along which the nozzles 70 are laid out and the two sections separate along the center lines of the nozzles so that the latter may be formed by casting and accuracy and uniformity of work insured. This construction is also advantageous in that it permits the spray ball to be conveniently opened up for cleaning.

The pump, by means of which water from reservoir 45 is forced through inlet pipe 47 and the spray rotor, is separable from the washing machine and constitutes, with its propelling means, a distinct unit, which can be separately manufactured as such and thereafter applied to the machine in a comparatively simple manner. This unit is shown, apart from the washing machine, in Fig. 7. The motive power for the pumping apparatus preferably consists of an electric motor, indicated conventionally at 75. This motor may be of small size, but should run at very high speeds and a motor, similar to those used on the ordinary household type of vacuum cleaner, has substantially the desired characteristics. The frame of motor 75 has two lugs 76 provided thereon through which freely pass the upper ends of two vertically disposed distance rods 77, having nuts 78 threaded upon their upper ends. Below each lug 76 and coiled around its rod 77 is a spring 79 and below the spring a resilient, and shouldered bushing 80, such as rubber or the like. These shouldered bushings slip

sidewise into slots 81 (Fig. 9), formed in lugs 82 on the interior and near the upper end of the casting forming reservoir 45, with the shoulders of the bushing resting upon the lugs and thus supporting the springs 79. The lower ends of rods 77 are offset inwardly sufficiently to freely slip between lugs 82 and as the unit is lowered into reservoir 45, the upper portions of the rods enter slots 81. The motor 75 is supported yieldingly by these springs, and in such a manner as to prevent the transmission of vibrations to tank 10, which, on account of its drum-like character, would intensify these vibrations and make the machine very noisy in operation.

The lower ends of rods 77 are fixed to, and support, a casing 83 which has a central axial opening therethrough and two ports 83^1 and 83^2 leading laterally therefrom (Fig. 11). The port 83^1 communicates with a pipe 84 fixed to casing 83, which pipe, as shown in Fig. 1, is adapted to be connected to the inlet pipe 47. Preferably, this connection is effected in such a manner as to prevent the transmission of vibrations from the power-pumping device to tank 10 and may desirably consist of a rubber hose 85. The port 83^2 communicates with a vertically disposed discharge pipe 86 which extends upwardly outside tank 10 for a purpose to be later described. Rotatably mounted in the central axial opening in casing 83 is a plug valve 87 having a closed upper end, a chamber 88, an opening at its lower end to chamber 88, and a lateral port 89, which may be moved into registry with either port 83^1 or 83^2 by turning the plug valve. The latter has a flange 90 at its upper end which rests upon the upper face of casing 83 and supports the plug valve. The chamber 88 receives a screw 91, having a spindle 92 which extends upwardly through, and is rotatably mounted in, the plug valve 87. As shown in Fig. 1, the casing 83 is adapted to be positioned in reservoir 45 and, on rotation of the screw 91, water entering chamber 88 through its open lower end is forced through port 89 into one or the other of the ports 83^1 and 83^2 and thus either into inlet pipe 47 or into discharge pipe 86, the purpose of the latter being to drain the reservoir 45. Drain openings x are provided in the lower walls of ports 83^1 and 83^2 to prevent the trapping of water therein and in the pipes connected thereto when either of the ports is closed off. Complete drainage of the reservoir may be effected, whenever desired, by removing a plug 93 in the base of reservoir 45.

The pump screw 91 is rotated at very high speed by motor 75 and the connection between these members is made in the following manner. Fixed to the upper end of spindle 92 is a coupling 93′ having a transverse slot 94 in its upper end. A similar coupling 95 is fixed to the lower end of the shaft 96 of the armature of motor 75. A driving link 97 of rectangular cross section extends between the couplings 93′ and 95 and has its ends received in the slots 94 and also has central projections 98 on its ends to enter the ends of the holes in the couplings to retain the link from lateral displacement in its slots. This sort of a connection is the equivalent of a universal joint and eliminates the necessity for precise alignment of shaft 96 and spindle 92.

Above the motor 75 is a control panel 100, in the nature of a horizontally disposed bracket having legs 101 which are suitably and preferably permanently, secured to the peripheral wall of tank 10. Mounted on this panel are all the devices needed to control the operation of the machine. These devices include an attachment plug device 102, for connection to a source of electrical supply, and a switch 103 which are connected electrically in circuit with motor 75 by means not shown so that switch 103 will control the starting and stopping of the motor 75.

For controlling valve plug 87, an operating handle 104 is rotatably mounted in panel 100 and its lower end is connected by yoke 105 to the flanged end of plug 87,—this yoke being bent to clear the motor 75 and so attached to the plug that when the connection to handle 104 is removed the yoke may be swung outwardly to clear panel 100 and permit removal of the motor and pumping unit. For yieldingly holding the valve plug 87 in either of the two positions it may assume, the following device is employed. A wire clip is bent up in the form shown in Fig. 8 to afford a central straight portion 106 with two portions 107 diverging from its ends. The ends of the last-named portions are bent backwardly upon themselves, forming portions 108, intermediate the ends of which are substantially semi-circular portions 109. By springing the portions 107 toward each other they may be inserted between the distance rods 77 and so positioned that, when released, the semi-circular portions 109 engage these rods, whereby the wire clip is held in position. This clip preferably rests upon the tops of bushings 80 and is held thereto by the springs 79. The yoke 105 can assume either of the two positions shown in Fig. 8 by full and dotted lines, and one portion 107 and the portion 106 lie closely adjacent the yoke when in these respective positions. In order to move from one position to the other the yoke must engage the corner of the clip which connects these portions and in order to pass this corner the clip or the yoke, or both, will have to be deflected to permit this action, whereby the yoke is retained in the positions mentioned except when intentionally moved

by handle 104. The free end of one portion 108 of the wire clip is formed with a coil eye 110 which is of slightly less diameter than the drain pipe 86 and encompasses the latter, functioning as a friction grip therefor and preventing it from turning under the vibrations set up by motor 75. The end of this coil is formed as a finger 105′ to abut rod 77 and prevent the coil from wrapping up and binding on the pipe when the latter is turned in one direction,—the portion 108 preventing similar action when the pipe is turned in the other direction. The other portion 108 has a similar but smaller eye 111, which receives and guides a stem 112. This stem is fixed to a float 113 which is received in the reservoir 45. The upper end of stem 111 carries an indicator portion 114 which is slidably received in panel 100 and may be read with reference thereto to determine the level of water in the reservoir.

For the purpose of filling the reservoir, an opening 115 (Fig. 1) is provided in the panel 100 and a curved pipe 116 connects this opening to the interior of tank 10. The space between panel 100 and the upper end of the reservoir forming portion of casting 40 is preferably enclosed, as by a sheet metal hood 117, which preferably is provided with louvers 118.

The drain pipe 86, heretofore mentioned, is rotatably seated in the casing 83 in any suitable way and passes upwardly through panel 100 terminating slightly thereabove. A smaller pipe 120 is inserted in the upper end of pipe 86 and united thereto by sweating it in. This pipe 120 is bent to form a long nozzle which may be swung from the position shown in Fig. 1 to that shown in Fig. 2, in which latter position the outlet end of the nozzle projects sufficiently beyond the machine so as to overlie a sink *s* when the machine is wheeled closely adjacent thereto. Thus, when so positioned and when valve 87 is turned to connect the chamber 88 to pipe 86, substantially the entire liquid contents of the machine may be ejected into the sink and thence to the sewer.

The pipe 86 (Fig. 7) has a slot 121 therein into which a screw 122, threaded into panel 100, extends. The circumferential extent of slot 121 is sufficient to permit the described angular range of movement of nozzle 120, and the interengagement of the screw and slot limits the angular movement of pipe 86. Such interengagement also acts to hold pipe 86 against vertical displacement and yet permits the pipe to be conveniently removed by lifting it vertically when the screw is withdrawn from the slot. The slot 121 may be cut entirely through pipe 86 for the pipe 120 is inserted far enough into the latter to close the slot against leakage. Preferably, pipe 86, unless machined to closely fit the hole in panel 100, is grooved to receive a friction ring 123 which bears against the wall of the hole through which pipe 86 passes and prevents it from rattling under the vibrations set up by motor 75.

In order to permit the reservoir of the machine to be conveniently filled from the faucet, such as the hot water faucet shown in Fig. 2, I provide a flexible hose 124 which carries at one end a nozzle 125, for insertion in hole 115 of the control panel. The other end of hose 124 is connected to faucet *f* and I prefer to provide a device for this purpose which may be left attached to the faucet and yet permit the latter to be used in the ordinary manner for other purposes when desired. To this end, I provide the device shown in Figs. 21 and 22 which includes a bracket made in two parts 127 and 128 adapted to be clamped together and to the nozzle of faucet *f* by screws 129. Pivoted to member 127, at 130 is a bracket 131 made up of stiff wire bent to form a loop 132 and having in the two end extensions of this loop eyes 133 through which pivot 130 is passed. Beyond eyes 133 are projecting ends 134 which are adapted to be engaged by the free end of a flat spring 135 fixed at its other end to member 127. An elbow 136 is received in loop 132 and is preferably free to rotate therein. One end of elbow 136 is connected to hose 124 and the other end has a funnel portion 137 formed therein to receive the outlet end of faucet *f*. Such funnel forms an exterior shoulder on the elbow to engage loop 132 which is received and closely fits between such shoulder and a bead 138 on elbow 136. The elbow 136 may be swung from the position shown in full lines in Fig. 22, wherein funnel 137 fits over the mouth of faucet *f*, to the position shown by dotted lines in which the funnel is removed from the path of water issuing from the faucet. When in either position, the spring 135 acts on projections 134 in such a manner as to releasably hold it in such positions and when in the first named position the spring may be utilized to swing member 132 toward the faucet, and if desired, press the funnel 137 tightly against the mouth thereof.

As a desirable adjunct to the machine, I may provide, in addition to the screen associated with the opening 41, a second screen and so arrange these screens that either may be brought into play, as desired. The idea of this arrangement is to allow one screen to function during the washing operation and the other during the rinsing operation, and to arrange the screens so that the clean rinsing water may be prevented from passing over the accumulations on the first named screen. This result may be accomplished in any suitable way, and as an illustrative example, the structure shown in Fig. 23 may be employed. Slidably mounted in

opening 41 is a ring like frame 140, which is provided intermediate its ends with a plurality of openings 141 in its circumferential wall. Above these openings, a screen 142 is provided to cover the upper end opening of frame 140, and below these openings, a similar screen 143 is mounted in a similar way. A shield 144 overlies the screen 142 and is supported in spaced relation with the latter from frame 140, so that water can reach screen 142 between the shield and screen but cannot descend directly upon it from above. To the lower end face of frame 140 a spider 145 is secured, and this spider is supported in the free end of a lever 146 pivoted at 147 to the base of tank 10. The other end of lever 146 is connected to a wire or rod 148 which extends vertically upwardly outside tank 10 and inside hood 117, to and through the control panel 100. By pushing downwardly on rod 148, the frame 140 may be lifted sufficiently to raise screen 142 above the level of water in tank 10 and allow the openings 141 to communicate with tank 10, so that water from the tank enters these openings and passes through the lower screen 143. To hold the frame 140 in lifted position, any suitable means may be employed, such as the spring latch 149 shown in Fig. 24, which is adapted to engage in under panel 100 when the rod 148 is depressed and releasably hold the latter in depressed position,—the latch being releasable to permit rod 148 to be moved upwardly into the illustrated position, when desired, by pressing it toward rod 148.

In using the machine, it may be wheeled into the dining room adjacent the table and there loaded with the articles to be washed. The cups, glasses and bowls are placed mouth down on grid G and larger bowls, tureens and so forth may be placed over them if desired. The knives, forks and spoons are placed on end in silver holder S and by its frusto conical construction are allowed to spread out to permit more effective washing of the ends which most require it,—such ends preferably being placed uppermost in the holder. The plates, saucers and so forth are placed around the edge of the basket, with the larger plates and platters located in the outer and higher holders.

The machine is then wheeled back to the kitchen and placed adjacent the sink. Washing powder may then be sprinkled over the dishes after which the cover is closed. The reservoir is then filled with hot water, preferably and most conveniently by utilizing the device shown in Figs. 21 and 22, and the operator can readily tell by the indicator 114 of the float gage when the proper amount of water has been supplied. The electric connection is then made to the device 102 and switch 103 closed to start the motor, whereby screw 91 is set in motion at high speed to force the water through the tubes of the spray rotor. Water issuing from the latter through nozzles 64 causes the rotor to revolve and the jets from nozzles 60, 60′, 64 and 70 engage the dishes in the manner heretofore described in detail. An operation of the machine for two or three minutes is usually sufficient to thoroughly wash the dishes. The nozzle 120 of the drain pipe 86 is then swung over the sink s and the handle 104 turned to cause valve 87 to connect chamber 88 with the discharge pipe, whereupon the washing water is ejected into the sink. The valve 87 is then reset to its former position, the machine refilled with clean hot water, and again operated for a minute or so to rinse the dishes. The rinsing water may then be discharged from the machine, as already described, or it may be left for subsequent use as washing water if another batch of dishes is soon to be washed. The motor is then stopped and the dishes allowed to drain, the cover being first lifted to dissipate the steam. After the dishes have become thoroughly dry, the machine may be wheeled to the china closet and the dishes removed.

The invention has been disclosed in an embodiment at present preferred, for illustrative purposes, but the scope of the invention is defined by the appended claims rather than by the foregoing description.

What I claim is:

1. In a washing machine, a washing compartment, an inlet pipe opening into the latter, means to force liquid through said pipe, a spray rotor in said compartment having a part mounted in telescoping relation with said pipe and rotatable relatively thereto during the washing operation, and releasable means in the compartment for preventing relative axial displacement of said rotor and pipe.

2. In a washing machine, a washing compartment, having an inlet opening through one wall thereof, means to force liquid through said opening, and a spray rotor in said compartment having a part to fit into said opening in telescoping and rotatable relation therewith, a flange on said part, one face of which engages the wall adjacent said opening and prevents axial movement of the rotor in one direction, and a releasable latch in the compartment to engage the other face of said flange and prevent axial movement of the rotor in the opposite direction.

3. In a washing machine, a washing compartment, having an inlet passage formed in the base thereof in communication with said compartment, and having a vertical pipe-like portion, a spray rotor having a pipe-like portion rotatably mounted in telescoping relation with the first named pipe-like portion, a shaft extending from said portion of the rotor into the first named pipe-like

portion, and a bearing provided in the latter to rotatably receive said shaft.

4. A washing machine, comprising, a washing tank, said tank having an opening in the base thereof, a reservoir provided exteriorly of the tank and underlying said opening and extending laterally beyond the tank, an inlet pipe to the tank extending towards the reservoir and terminating beneath said opening, a pumping apparatus removably connected to the tank and having a part to enter said reservoir in its lateral extending part, a discharge pipe connected to said apparatus and projecting into the reservoir for connection to said inlet pipe, and means for effecting the last-named connection, access for this purpose being afforded by the first-named opening.

5. A washing machine, comprising, a washing tank, said tank having an opening in the base thereof, a screening device removably mounted in said opening, a reservoir provided exteriorly of the tank and underlying said opening and extending laterally beyond the tank, an inlet pipe to the tank extending towards the reservoir and terminating beneath said opening, a pumping apparatus removably connected to the tank and having a part to enter said reservoir in its laterally extending part, a discharge pipe connected to said apparatus and projecting into the reservoir for connection to said inlet pipe, and means for effecting the last-named connection, access for this purpose being afforded by the first-named opening when said screening device is removed.

6. In a washing machine, a washing compartment having a drain opening therein through which the water is returned to a reservoir associated therewith, a reservoir, means to supply liquid from the latter into the former for the washing operation, dual screening means associated with said opening, and means for causing the water to pass mainly through only one of said screening means when desired.

7. In a washing machine, a washing compartment having a drain opening therein through which the water is returned to a reservoir associated therewith, a reservoir, means to supply liquid from the latter into the former for the washing operation, dual screening means associated with said opening, and means for moving one of said screening means out of the main path of the returning water when desired.

8. In a washing machine, a washing compartment having a drain opening therein through which the water is returned to a reservoir associated therewith, a reservoir, means to supply liquid from the latter into the former for the washing operation, a ring frame slidable in said opening, two screens mounted in spaced relation in said frame, an opening in the periphery of said frame disposed between said screens and normally closed by the wall of the first named opening, and means for lifting said frame to raise the upper screen out of the main path of the returning water and uncover the last named opening to permit the water to enter therethrough and reach the lower screen.

9. In a washing machine, a washing compartment having a drain opening therein through which the water is returned to a reservoir associated therewith, a reservoir, means to supply liquid from the latter into the former for the washing operation, a ring frame slidable in said opening, two screens mounted in spaced relation in said frame, an opening in the periphery of said frame disposed between said screens and normally closed by the wall of the first named opening, means for lifting said frame to raise the upper screen out of the main path of the returning water and uncover the last named opening to permit the water to enter therethrough and reach the lower screen, and a shield overlying the upper screen in spaced relation therewith.

10. In a washing machine, a washing tank, a reservoir communicating with the base of the tank and projecting there-beyond with an open upper end, slotted lugs provided on the inner wall of the reservoir near such end, a pump, a motor, distance rods rigidly holding them together, said connected motor and pump constituting a unit applicable to and removable from the machine as such, said pump being insertable in the reservoir and said distance rods adapted to enter said slotted lugs, and springs on the distance rods for resiliently supporting said unit from said lugs to prevent transmission of vibrations to the washing tank.

11. In a washing machine, a washing tank, and a spray rotor having a substantially central axis of revolution and oppositely extending spray tubes at right angles to said axis and provided with propulsive nozzles and other nozzles to effect the washing operation, a support for the dishes adjacent one face of which said tubes are movable, a tube comprising a part of the rotor and having an axis coincidental with the axis of revolution and extending through said support, and adapted to be rotated by said spray arms whereby other spraying means carried thereon may be caused to rotate, spraying means carried on the outer end of the last named tube, and a holder for silver ware and the like encompassing the latter.

12. In a washing machine, a washing tank, a holder for dishes therein, a spray rotor having a central tube whose axis is coincidental with the axis of revolution of the rotor and which extends through said holder, and tubes movable adjacent said holder and extending substantially at right angles to and on opposite sides of the axis of revolu-

tion, propulsive nozzles provided in the last named tubes to emit jets at acute angles to the plane in which they revolve, other nozzles to emit jets at right angles to said plane, some of the last named nozzles emitting jets substantially parallel with said axis of revolution and others in diverging relation therewith so as to strike the wall of said tank, and spraying means carried on the outer end of the central tube and rotated thereby to direct jets at various angles into the dish holder from a side thereof opposite to that from which the other jets are emitted.

In testimony whereof I have affixed my signature.

HENRY CAVE.